

**Teerthanker Mahaveer University**  
**College of Engineering**  
**Internal (3<sup>st</sup> Semester) Examination 2009-2010**

**Course Name: B.Tech**

**Maximum Time: 1.30**

**Subject Name: INSTRUMENTATION AND MEASUREMENT**

**Maximum Marks: 50**

**Subject Code: EEE302**

NOTE: Attempt any three questions out of four Q1, is compulsory.

Q1. Attempt any four questions.

- a) Classify the resistance from the point of view of measurement .write all the method for the measurement of low, medium and high resistance.
- b) Explain the loss of charge method for measurement of insulation resistance of cables.
- c) An owen's bridge is used to measure the properties of a sample of shut steet at 2KHz at balance arm ab is test spuimam ; arm b c is  $R_3 = 10000 \Omega$ ; arm cd is  $C_u = 0.1 \mu f$  and arm da is  $R_2 = 83400 \Omega$  in series with  $C_2 = 0.124 \mu f$  . Drive balance condition and calculate the effective impedance of the specimen under test conditions.
- d) Describe the working of Hay's bridgs for measurement of inductance. Drive the equations for balance and draw the power diagram under condition of balance.
- e) Give some advantage and disadvantage of potentiometer.
- f) Describe how A.C. potentiometer can be used for calibration of voltmeter.

Q2.a) Describes the circuit and working of Q meter, mention its application. [10]

- b) a coil of resistance  $10 \Omega$  is connected in the Q meter circuit. Resonance occurs at a frequency of 1 MHz with the tuning capacitor set at 65 Pf. Calculate the Percentage error introduce in the calculated value of Q if a resistance of  $0.02 \Omega$ . is used across the oscillator circuit. [5]

Q3.a) Describe with the help of diagram. The principle and construction of polar potentiometer. [7.5]

- b) A  $2.5 \mu f$  capacitor is charged to a potential difference of 450 volts. The capacitor is disconnected from the supply and the reading on an electro static voltmeter in Parallel with the capacitor is observed to fall to 280 volt in 15.2 minutes.

The test is repeated with a resistance R in Parallel with the capacitor and voltmeter. The voltmeter's reading is now found to fall from 450 volt to 280 volt in 10.8 minutes . [7.5]

Q4.a) Drive the expression for the sensitivity of wheat stone bridges. [7.5]

- b) Discuss the procedure for the determination of flux density in a ring specimen [7.5]

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Q1. Attempt any four questions.(4\*5=20)

- a) What is a “bridge circuit” ? How are detector classified?
- b) The impedance of the basic A.C. bridge are given as follow:  
 $Z_1 = 100\Omega \angle 80^\circ$  ;  $Z_2 = 250\Omega$ ;  $Z_3 = 400\Omega \angle 30^\circ$  ;  $Z_4 = \text{unknown}$
- c) Determine the constant of the unknown arm.
- d) Explain ammeter – voltmeter method for the measurement of medium resistance.
- e) How the term dissipation factor and quality factor relate to each other? explain
- f) Write short notes on the De sauty bridge.
- g) Explain how to calibrate wattmeter with the help of AC. Potentiometer.

Q2. a) Describe the working of Anderson’s bridge .Draw phase diagram and balance conditions. (10)

- b) The following data were obtained during the measurement of the distributed or self capacitance of a coil:  
First measurement :  $f_1 = 2 \text{ MHz}$  and  $C_1 = 460 \text{ pF}$   
Second measurement :  $f_2 = 4 \text{ MHz}$  and  $C_2 = 100 \text{ pF}$   
Find the distributed capacitance. (5)

Q3.a) Name the different forms of A.C. potentiometer. Explain any one with suitable diagram. (7.5)

- b) A  $2.5 \mu\text{F}$  capacitor is charged to a potential difference of 450 volts. The capacitor is disconnected from the supply and the reading on an electro static voltmeter in Parallel with the capacitor is observed to fall to 280 volt in 15.2 minutes. The test is repeated with a resistance R in Parallel with the capacitor and voltmeter. the voltmeter’s reading is now found to fall from 450 volt to 280 volt in 10.8 minutes . (7.5)

Q4.a) Drive the expression for the sensitivity of wheat stone bridges. (7.5)

- b) Discuss the procedure for the determination of flux density in a ring specimen (7.5)

